# Nanometer-scale structure and properties of amorphous alloys

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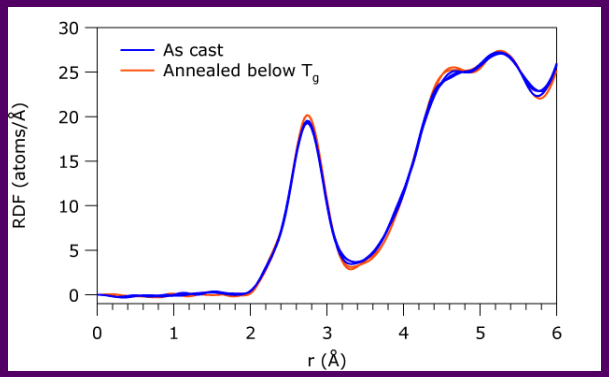
## Motivation

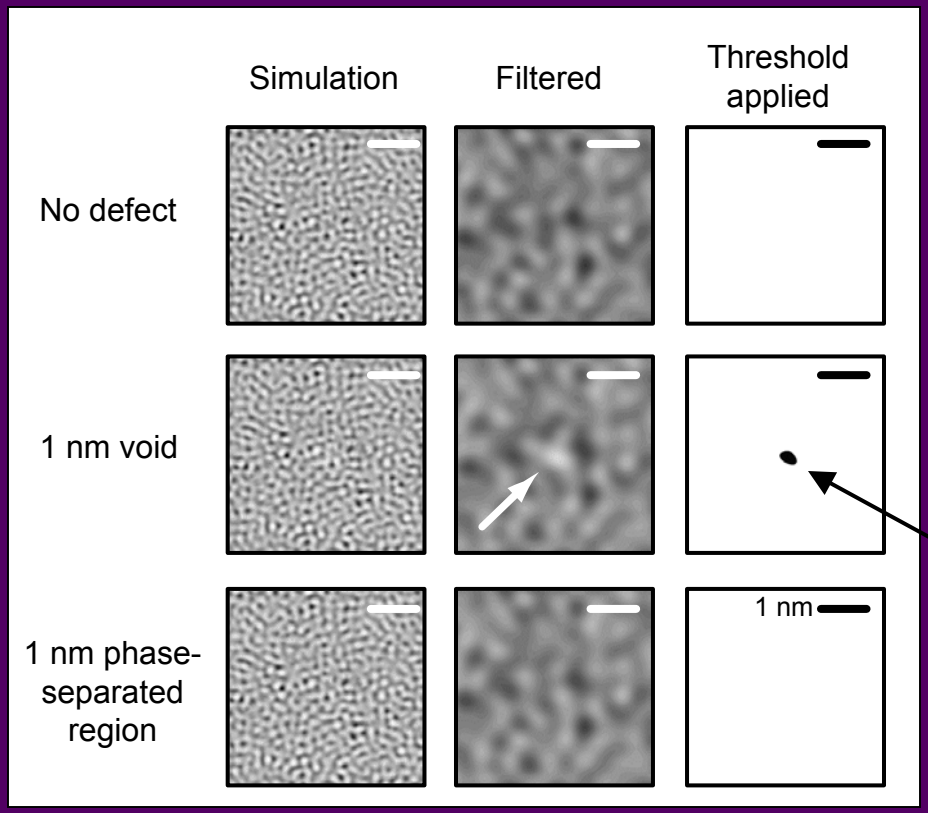
Amorphous alloys combine high strength with easy processing. We are trying to understand the structure of these materials on the nanometer scale.

## Relaxation




X-ray scattering data shows that annealing of Pd-Ni-P metallic glass causes significant changes in the *second* nearest atomic neighbor environments.

## Simulation of voids in shear bands




Simulations of high-resolution electron microscope images confirm that defects previously observed in shear bands are voids that result from coalescence of excess free volume.

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## Broad Impact:

• Resonant x-ray scattering experiments were performed at the Stanford Synchrotron Radiation Laboratory. Publications resulting from this work will have an SSRL co-author.

• An upcoming News and Views article in *Nature Materials* will highlight the importance of fluctuation electron microscopy and nanometer-scale structure in amorphous materials.

## Education:

One post-doc, one graduate student, and a high school student are involved in this work.

• An invited talk on structure and defects in metallic glasses was presented at the *Microscopy and Microanalysis 2004* meeting in Savannah, Georgia.

•A high school student (Wayland Chen) is participating in research on relaxation of metallic glasses as part of a collaboration with Project Ingenuity at Baltimore Polytechnic High School.

•The graduate student (Stephan Hruszkewycz) participated in the National School on X-ray and Neutron Scattering at Argonne National Laboratory (August, 2004).